PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 609304C:ANB:RDG	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. **PCT/AU2003/001546**	International Filing Date *(day/month/year)* 18 November 2003	Priority Date *(day/month/year)* 18 November 2002
International Patent Classification (IPC) or national classification and IPC **Int. Cl.** [7] C05B 11/00		
Applicant MCCONCHIE, David et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

   [X] This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 2 sheet(s).

3. This report contains indications relating to the following items:

   - I [X] Basis of the report
   - II [ ] Priority
   - III [ ] Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV [ ] Lack of unity of invention
   - V [X] Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI [ ] Certain documents cited
   - VII [ ] Certain defects in the international application
   - VIII [ ] Certain observations on the international application

Date of submission of the demand	Date of completion of the report
2 April 2004	8 October 2004
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer GAVIN THOMPSON Telephone No. (02) 6283 2240

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/AU2003/001546

I. Basis of the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed.

☒ the description, pages **1-2 , 4-11** as originally filed,
pages , filed with the demand,
pages **3** received on **7 October 2004** with the letter of **7 October 2004**

☒ the claims, pages **13-14** as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages **12** received on **7 October 2004** with the letter of **7 October 2004**

☒ the drawings, pages **1/2-2/2** as originally filed,
pages , filed with the demand,
pages , received on with the letter of

☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report*

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-21	YES
	Claims	NO
Inventive step (IS)	Claims 1-21	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-21	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

The instant invention is novel and inventive over the prior art including the closest art, D1: WO 2002/34673 A.

It discloses a composition of red mud (defined therein as: bauxite refinery residues (p.1 l. 27) which is understood by the instant application and D1 as being more than moderately alkaline) mixed with water containing sufficient calcium and magnesium ions to substantially reduce the pH to 10.5 (D1's p. 5 l. 9-11). The water is 5 parts to red mud in 1 part by weight. It can comprise phosphate (p.4 l. 13). (Gypsum p.5 l. 19.)

The feature of a sparingly soluble phosphate fertiliser discriminates the instant invention in relation to D1. D1 does not teach toward this feature either.

INDUSTRIAL APPLICABILITY (IA)

While no unified criteria exist for determining what belongs in this category, there is nothing evident in the claims that would deprive them of affirmation in this category.

neutralised by addition of one or more minerals containing calcium and/or magnesium (such as gypsum), the phosphate binding substance having a reaction pH, when mixed with 5 times its weight of water, of less than 10.5.

Surprisingly, the present inventors have found that although the methods and compositions of the invention involve the use of a phosphate fertiliser with a phosphate binding substance, nevertheless in the methods of the invention such as when the compositions of the invention are applied to soils, the phosphate remains sufficiently available to plants for the phosphate fertiliser to retain its fertilising capability even though the phosphate is sufficiently bound that it is substantially prevented from being leached from the soil by rainfall, or at least its ability to be leached from the soil is appreciably decreased.

Brief Description of the Drawings

In the accompanying drawings, Figure 1 is a graph showing the changes over 65 days in concentration of phosphorus in aqueous solutions that are in contact with pellets containing various compositions in accordance with the invention, compared to pellets of superphosphate alone.

Figure 2 is a graph showing the cumulative loss of phosphorus from pellets containing various compositions in accordance with the invention, compared to superphosphate alone, when subjected to a succession of simulated rainfall events.

Detailed Description of the Invention

In the fertiliser compositions and methods of the invention the phosphate fertiliser is any phosphate-containing substance known to the art for use for fertilising soils. Examples of such phosphate fertilisers include normal superphosphate, double superphosphate, triple superphosphate, monoammonium phosphate, diammonium phosphate, ammonium polyphosphate, nitric phosphate, struvite and phosphate rock. Usually the phosphate fertiliser is normal superphosphate or triple superphosphate or diammonium phosphate. Suitable phosphate fertilisers may be sparingly soluble. Sparingly soluble phosphate fertilisers may be defined as having a solubility in water of less than about 40 g/l, or less than about 30, 20, 15 or 10 g/l.

Preferably, the phosphate binding substance is red mud from bauxite refinery operations that has been at least partially reacted with calcium and/or magnesium ions so as to have a reaction pH, when mixed with 5 times its weight of water, of less than 10.5. More preferably the reaction pH, when mixed with 5 times its weight of water, is less than a value selected from the group consisting of about 10, about 9.5, about 8.5 and about 8. This material will be referred to herein as "treated red mud". The reaction pH of treated red mud, when mixed with 5 times its weight of water, may be about 8 -

The claims defining the invention are as follows:

1. A fertiliser composition comprising from 95% to 1% by weight, based on the total weight of the fertiliser composition, of a sparingly soluble phosphate fertiliser and from 5% to 99% by weight, based on the total weight of the fertiliser composition, of a phosphate binding substance selected from the group consisting of red mud that has been at least partially reacted with a material comprising at least one of calcium ions and magnesium ions, red mud that has been at least partially neutralised by addition of acid, red mud that has been at least partially neutralised by treatment with carbon dioxide, and red mud that has been at least partially neutralised by addition of at least one mineral containing at least one of calcium ions and magnesium ions, the phosphate binding substance having a reaction pH, when mixed with 5 times its weight of water, of less than 10.5.

2. A fertiliser composition according to claim 1 comprising from 50% to 25% by weight, based on the total weight of the fertiliser composition, of the phosphate fertiliser and from 50% to 75% by weight, based on the total weight of the fertiliser composition, of the phosphate binding substance.

3. A fertiliser composition according to claim 1 wherein the phosphate binding substance is red mud that has been at least partially neutralised by treatment with carbon dioxide.

4. A fertiliser composition according to claim 1 additionally comprising one or more components selected from the group consisting of nitrogen containing compounds, potassium containing compounds and trace metals.

5. A fertiliser composition according to claim 1 in a form selected from the group consisting of powder, granules, pellets and tablets.

6. A fertiliser composition according to claim 1 wherein one of at least one mineral containing at least one of calcium ions and magnesium ions is gypsum.

7. A treated red mud when used in a fertiliser composition according to claim 1.

8. A process for preparing a fertiliser composition, said process comprising homogeneously mixing a sparingly soluble phosphate fertiliser and a phosphate binding substance, wherein the phosphate binding substance is selected from the group consisting of red mud that has been at least partially reacted with a material comprising at least one of calcium ions and magnesium ions, red mud that has been at least partially neutralised by addition of acid, red mud that has been at least partially neutralised by treatment with carbon dioxide, and red mud that has been at least partially neutralised by addition of at least one mineral containing at least one of calcium ions and magnesium ions, the phosphate binding